

**EPA Superfund
Record of Decision:**

**ELLSWORTH AIR FORCE BASE
EPA ID: SD2571924644
OU 12
ELLSWORTH AFB, SD
05/10/1996**

Final

**Record of Decision for
Remedial Action at Operable Unit 12
Ellsworth Air Force Base, South Dakota**

United States Air Force
Air Combat Command
Ellsworth Air Force Base

April 1996

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1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

- Operable Unit 12 (OU-12), Hardfill No. 1, Ellsworth Air Force Base(EAFB), National Priorities List Site.
- Meade and Pennington Counties, South Dakota

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document describes EAFB's selected remedial action for OU-12, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the contents of the Administrative Record for OU-12, EAFB. The U.S. Environmental Protection Agency (EPA) and the South Dakota Department of Environment and Natural Resources (SDDENR) concur with the selected remedial action.

1.3 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from OU-12, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 DESCRIPTION OF SELECTED REMEDY

Twelve potentially contaminated areas, or operable units, have been identified at EAFB. This ROD is for a remedial action at OU-12 (Hardfill No. 1, approximately 14 acres) and is the ninth ROD for EAFB.

The selected alternative, capping, includes the following major components:

- Placing a soil cover capable of sustaining perennial vegetation over the hardfill area;
- Pre-design study to identify the source of methane and examine the need for hardfill gas control measures, and evaluate the need for erosion control measures along the stream adjacent to the hardfill areas,
- Institutional controls for the hardfill areas;
- Long-term monitoring;
- Long-term maintenance of soil cover.

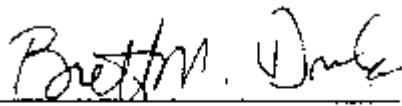
Implementation of the remedy will reduce the future risk to human health and the environment to acceptable levels.

1.5 STATUTORY DETERMINATION

The selected remedy is protective of human health and the environment, complies with Federal and the State of South Dakota requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable for OU-12. However, because treatment of the principal threats of the OU was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element. The large size of the hardfill and the fact that there are no apparent on-site hot spots that represent major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

Because this remedy will result in hazardous substances remaining on-site beneath the hardfill cover area, a review will be conducted no less often than every five years after signing of the ROD to ensure that the remedy continues to provide adequate protection of human health and the environment.

1.6 SIGNATURE AND AGENCY CONCURRENCE ON THE REMEDY


BRETT M. DULA
Lieutenant General, USAF
Vice Commander

15 May 96
Date

JACK W. MCGRAW
Acting Regional Administrator
U.S. Environmental Protection Agency Region 8

Date

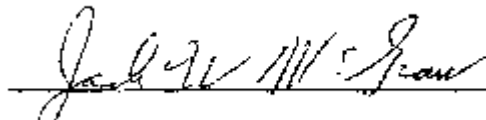
NETTIE H. MYERS, Secretary
Department of Environment and Natural Resources
State of South Dakota

Date

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BRETT M. DULA
Lieutenant General, USAF
Vice Commander

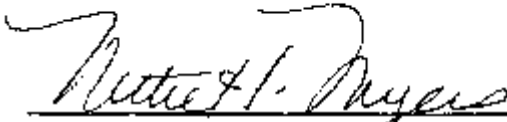
Date



5-10-96

JACK W. MCGRAW
Acting Regional Administrator
U.S. Environmental Protection Agency Region 8

Date



5-9-96

NETTIE H. MYERS, Secretary
Department of Environment and Natural Resources
State of South Dakota

Date

2.0 DECISION SUMMARY

2.1 SITE NAME AND LOCATION

EAFB is a U.S. Air Force Air Combat Command (ACC) installation located 12 miles east of Rapid City, South Dakota, and adjacent to the small community of Box Elder (Figure 2-1).

EAFB covers approximately 4,858 acres within Meade and Pennington counties and includes runways and airfield operations, industrial areas, and housing and recreational facilities (Figure 22). Open land, containing a few private residences, lies adjacent to EAFB on the north, south, and west, while residential and commercial areas lie to the east of the Base.

2.2 OPERABLE UNIT 12 (OU-12) DESCRIPTION/HISTORY AND REGULATORY OVERSIGHT ACTIVITIES

2.2.1 Description/History

Ellsworth Air Force Base (EAFB) was officially activated in July 1942 as the Rapid City Army Air Base, a training facility for B-17 bomber crews. It became a permanent facility in 1948 with the 28th Strategic Reconnaissance Wing as its host unit. Historically, EAFB has been the headquarters of operations for a variety of aircraft, as well as the Titan I Intercontinental Ballistic Missile, and the Minuteman I and Minuteman II missile systems. The Air Force has provided support, training, maintenance, and/or testing facilities at EAFB. Presently, the 28th Bombardment Wing (B-1B bombers) is the host unit of EAFB.

OU-12 is located in the southern half of EAFB, immediately north of the Alert Apron and southwest of the Primary Instrument Runway (Figure 2-3). OU-12 is the area designated as Hardfill No. 1 which is approximately 14 acres in size. OU-12 was identified as a hardfill, rather than a landfill, because disposal records indicated that it only received construction debris such as wood, metal, concrete, and asphalt. An unnamed ephemeral drainage channel runs through the center of the hardfill which carries surface water runoff from the Base storm water management system. Storm water from taxiways, runways, and operations areas along the South Dock drain into this ephemeral drainage. The water in the drainage channel flows south to a ponded area in the center of the hardfill, and then southwest, around the Alert Apron, past OU-1, into Pond 001, and ultimately off Base.

Historical aerial photographs indicate the area has been used for dumping of construction debris such as wood, metal, concrete, and asphalt since the 1940s. Construction debris is visible over portions of OU-12, although much of the former disposal area is covered by vegetation. Disposal of hazardous materials has not been documented at OU-12; however, the area was designated as an operable unit based on historical disposal practices at the Base. The topography at OU-12 is characterized by a north-south unnamed, unlined ephemeral drainage channel through the center of the hardfill which carries surface water runoff from taxiways, runways, and other operations areas. Surface topography at OU-12 generally slopes toward the ephemeral stream. Hardfill areas encroach upon the east bank of the drainage channel and also serve as riprap in some places. The hardfill boundaries extend to the south, beneath the presentday Alert Apron. The drainage channel contains wetlands which are illustrated on Figure 2-4.

The shallow aquifer at EAFB is considered a potential drinking water source and possibly discharges to the surface. The ground water is classified as having a beneficial use as a drinking water supply suitable for human consumption (ARSD Chapter 74:03:15, Groundwater Quality Standards).

Deeper bedrock aquifers also exist beneath EAFB. These deeper aquifers are separated from the shallow aquifer by 800 feet of low-permeability clays and silts. In the past, EAFB utilized these deeper aquifers for its water supply. Presently, EAFB obtains its potable water from the Rapid City Municipal Distribution System.

2.2.2 Regulatory Oversight Activities

Environmental investigation activities at EAFB were initiated by the Air Force in 1985 through an Installation Restoration Program (IRP) Phase I Installation Assessment/Records Search and Phase U, Confirmation/Quantification. The Phase I study, dated September, 1985, identified a total of 17 locations at EAFB where releases involving hazardous substances potentially occurred.

In Phase II, of the IRP investigation, field activities included soil vapor surveys, geophysical surveys, surface and subsurface soil sampling, ground-water sampling, ground-water hydrologic testing, and ecological investigations.

On August 30, 1990 (55 Federal Register 35509), EAFB was listed on the U.S. EPA's National Priorities List (NPL). A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, the U.S. Environmental Protection Agency (EPA), and the State of South Dakota (SDDENR) and went into effect on April 1, 1992. The FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions for EAFB in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It also states the oversight procedures for EPA and the State to ensure Air Force compliance with the specific requirements. The FFA identified 11 site-specific operable units (OUs) and a Base-wide ground-water operable unit. The Base-wide ground-water OU is primarily used to address contaminated ground water that was not addressed during the investigation of a site-specific OU.

Listing on the NPL and execution of the FFA required the U.S. Air Force to perform a remedial investigation/feasibility study (RI/FS) to investigate the 12 operable units. In 1993 and 1994, an extensive RI field program was conducted to characterize conditions at OU-12. The program included: drilling and of boreholes, installation of monitoring wells, geotechnical analysis of soil samples, ecological evaluation, assessment of human health risks, and review and compilation of previous IRP investigations. Collection and laboratory analysis of soil, ground-water, surface water, and sediment samples were included in the RI field program.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community relations activities that have taken place at EAFB to date include:

- **FFA process.** After preparation of the FFA by the USAF, EPA, and SDDENR, the document was published for comment. The FFA became effective April 1, 1992.
- **Administrative Record.** An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.
- **Information repositories.** An Administrative Record outline is located at the Rapid City Library (public repository).
- **Community Relations Plan (CRP).** The CRP was prepared and has been accepted by EPA and the State of South Dakota and is currently being carried out. An update to this plan will be prepared in 1996.
- **Restoration Advisory Board (RAB).** The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to USAF, EPA, and South Dakota oversight personnel, the RAB includes community leaders and local representatives from the surrounding area.
- **Mailing list.** A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.
- **Fact sheet.** A fact sheet describing the status of the IRP at EAFB was distributed to the mailing list addressees in 1992.
- **Open house.** An informational meeting on the status of the IRP and other environmental efforts at EAFB was held on May 6, 1993. An open house was held November 16, 1995 in conjunction with the Restoration Advisory Board meeting. Information on the status of environmental efforts at EAFB was provided at the open house.
- **Newspaper articles.** Articles have been written for the base newspaper regarding IRP activity.
- **Proposed Plan.** The proposed plan on this action was distributed to the mailing list addressees for their comments.

A public comment period was held from December 28, 1995 to January 27, 1996, and a public meeting was held on January 11, 1996. At this meeting, representatives from EAFB answered questions about the remedial action. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

This ROD is based on the contents of the Administrative Record for OU-12, in accordance with the CERCLA, as amended by SARA, and the NCP. The RI/FS reports and the Proposed Plan for OU-12 provide information about OU-12 and the selected remedy. These documents are available at the Information Repositories at EAFB and the Rapid City Public Library.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The FFA identified 11 site-specific area operable units (OUs) as well as a Base-wide ground-water operable unit. The 12 operable units are identified as follows:

OU-1	Fire Protection Training Area
OU-2	Landfills Nos. 1 and 6
OU-3	Landfill No. 2
OU-4	Landfill No. 3
OU-5	Landfill No. 4
OU-6	Landfill No. 5
OU-7	Weapons Storage Area
OU-8	Explosive Ordnance Disposal Area (Pramitol Spill)
OU-9	Old Auto Hobby Shop Area
OU-10	North Hangar Complex
OU-11	Base-wide Ground Water
OU-12	Hardfill No. 1

This ROD is to document the selected remedy for the preferred remedial action (RA) at OU-12 and is the ninth ROD for EAFB. The remedial action objectives (RAOs) are to reduce the potential risks posed by contaminants in surface soils and to reduce the mobility of potential contaminants in the hardfill through containment.

The development of alternatives for OU-12 was conducted under EPA's Presumptive Remedies Approach [*Presumptive Remedies: Policy and Procedures (OSWER Directive 9355.0-47FS)*; *Presumptive Remedy for CERCLA Municipal Landfill Sites (OSWER Directive 9355.0-49FS)*]. By using this approach, selection of an alternative for remediation is streamlined by using preferred technologies based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation.

The presumptive remedy stipulates containment as the appropriate remedy for landfills. The response action, containment by capping, would remove risk associated with the ingestion, dermal contact, and inhalation exposure pathways. The area of attainment defines the area over which preliminary remediation goals would be achieved, and is based on the RAOs. The area of attainment would include hardfill areas not meeting appropriate closure standards. The remedy does not address leachate remediation since identified wastes placed in the hardfill do not typify that which would normally be associated with leachate production. Ground-water monitoring will identify whether leachate is being produced in the future.

2.5 SITE CHARACTERISTICS

This section describes the presence and distribution of contaminants at OU-12 as a result of past activities.

2.5.1 Soils

Volatile Organic Compounds (VOCs)

Five different VOCs were reported in the 1995 RI surface and subsurface soil samples from OU-12. The maximum reported value was 47 micrograms per kilogram ($\mu\text{g/kg}$) of toluene in a sample collected from the southern edge of OU-12.

Jet Fuel

Total petroleum hydrocarbons (TPH) as jet fuel was reported in 9 of 18 surface soil samples at a maximum concentration of 2,500 milligrams per kilogram (mg/kg). Jet fuel was reported in surface soil samples collected from both within and outside the identified hardfill areas. Jet fuel was not reported in capillary fringe samples, but was reported in three other subsurface samples at a maximum concentration of $260 \mu\text{g/kg}$.

Semi-Volatile Organic Compounds (SVOCs)

Twenty-three separate SVOCs were reported in surface soil samples collected during the RI at OU-12. The majority of the SVOCs was fuel related polycyclic aromatic hydrocarbon compounds (PAHs). Many of the reported SVOCs are considered to be related to Basewide activities associated with aircraft operations and not with disposal practices at the hardfill. The highest concentrations of surface-soil SVOCs were, however, reported in soil samples collected from near the soil piles and fill areas.

Pesticides

Two pesticides were reported in surface soil samples and two pesticides were reported in subsurface soil samples from OU-12. The maximum reported pesticide concentration was $33 \mu\text{g/kg}$ of p,p'-DDD in a surface soil sample. The reported concentrations are typical of urban and agricultural areas and are considered to be the result of past pest-management practices at EAFB.

Inorganic Constituents

Analytical results of surface soil samples indicated that the highest number of inorganic constituents above background were reported in a sample collected west of the soil piles. The largest number of these inorganic constituents was found in samples collected in the central-eastern portion of OU-12. The mean concentrations of some inorganic constituents in subsurface soil samples are 240 mg/kg for barium, 18.3 mg/kg for lead, 1563 mg/kg for manganese, and 21 mg/kg for arsenic. There appears to be no pattern in the distribution of the reported inorganic constituents. The random distribution suggests the natural occurrence of these compounds in the soil. However, these inorganic constituents were still evaluated in the risk assessment due to the uncertainty associated with the disposal practices.

2.5.2 Sediment

Organic Contaminants

Acetone was reported in one sediment sample at a concentration of 430 µg/kg, and carbon disulfide was reported in two samples at a maximum concentration of 35 µg/kg. Total petroleum hydrocarbons was reported in each of the seven sediment samples, at a maximum concentration of 20,000 µg/kg. Twenty-two SVOCs were reported in the OU-12 sediment samples, including PAHs, carbazole, 4-methylphenol, dibenzofuran, and phthalates. The highest reported SVOC concentrations were reported in the upgradient sample. The exact source of SVOCs in the sediment is not known, but impacts from upstream of OU-12 are considered likely. Pesticides were reported in each of the sediment samples. No discernible pattern was observed, and the source of the reported pesticides is considered to be Basewide pest management practices.

Inorganic Contaminants

Nineteen of the twenty inorganics analyzed for were reported in the six sediment samples from OU-12. The mean concentrations of some inorganic compounds detected in sediment samples are 384 mg/kg for barium, 149 mg/kg for lead, 685 mg/kg for manganese, and 15.4 mg/kg for arsenic. There does not appear to be any pattern to the distribution of the reported inorganic contaminants.

2.5.3 Ground Water

Ground-water sample results do not indicate any discernable ground-water contamination at OU-12. Low levels of certain contaminants were intermittently detected in ground-water samples from-isolated areas.

Organic Contaminants

Acetone was reported in three of ten ground-water samples at concentrations ranging from 11 micrograms per liter (µg/L) to 17 µg/L. Trichloroethene (TCE) was reported in two of ten samples at a maximum concentration of 7.0 µg/L. Total- 1,2-dichloroethene (DCE) was reported in one sample at a concentration of 19.0 µg/L, and 1,1,1-trichloroethane (TCA) was reported in one sample at an estimated value below the sample quantitation limit (SQL) of 0.40 µg/L. Two SVOCs (naphthalene and bis (2-ethylhexyl)phthalate) were reported in OU-12 ground-water samples. Five different pesticides were reported in the OU-12 ground-water samples. With the exception of one sample collected east of a hardfill area on the southern end of the OU, reported pesticides are associated with samples from wells located upgradient of OU-12 hardfill areas.

Inorganic Contaminants

Twelve inorganic constituents were reported at concentrations greater than the background range. Nickel and Antimony were the only inorganic constituents reported above the Safe Drinking Water Act Maximum Contaminant Level (MCL) of 100 µg/L and 6 µg/L, respectively. The inorganic constituents detected in ground water are considered to be the result of natural variations in geologic deposits because they were reported at levels consistent with background.

2.5.4 Surface Water

Organic Contaminants

Four VOCs, benzene, ethylbenzene, toluene, and xylene, were reported in surface water samples from OU-12. The exact source of the reported VOC is not known, but reported values are indicative of non-point source runoff from the industrial portion of the Base, taxiways, and aprons upstream of OU-12. Total petroleum hydrocarbons as jet fuel was reported in two of the six surface water samples at a maximum concentration of 180 µg/L. These two surface water samples were taken from locations further upstream than the other four surface water samples. The jet fuel in surface water samples is considered to be a result of discharge from the Base operation area upstream of OU-12. Eight SVOCs and one tentatively identified compound (TIC) were reported in surface water samples. The source of reported SVOCs is considered to be runoff from Base operations areas north of OU-12. One pesticide was reported in each of the three samples which were taken upstream from the hardfill areas. Reported concentrations are consistent with what would be expected with past pest-management practices at EAFB.

Inorganic Contaminants

Three analytes, arsenic, iron, and manganese, were reported at concentrations exceeding Federal Ambient Water Quality Criteria (FAWQC). The source of the reported inorganics in surface water is considered to be from a combination of naturally-occurring geologic deposits and Base operation areas upstream of OU-12.

2.6 SITE RISK SUMMARY

Human Health Risks

Risk Assessment Process

The assessment of human health risks for this OU considered the following topics:

- (1) Contaminants of concern (COCs) in ground-water, surface water, sediment, and soil samples taken at OU-12;
- (2) Current and future land-use conditions;
- (3) Potential environmental pathways by which populations might be exposed;
- (4) Estimated exposure point concentrations of COCs;
- (5) Estimated intake levels of the COCs;
- (6) Toxicity of the COCs; and
- (7) Uncertainties in the assessments of exposure, toxicity, and general risks.

Noncarcinogenic and carcinogenic risks were calculated for the following five potential exposure groups:

- (1) Current EAFB maintenance personnel mowing grass on-site;
- (2) The future child/adult living on-site who ingests or has dermal contact with surface soil;
- (3) The future adult living on-site who ingests and showers with shallow ground water;
- (4) Future adolescents who are exposed to surface water and sediment through wading; and,
- (5) Future adult construction workers who excavate on-site for building residences.

A quantitative risk assessment was performed for the ground water, soil, sediment, and air. The risk assessment evaluated potential effects on human health posed by exposure to contaminants within OU-12. Carcinogenic risks were estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential cancer-causing chemical. The acceptable risk range expressed as a probability is one cancer incident in ten-thousand people to one cancer incident in a million people. This level of risk is also denoted by 1×10^{-4} to 1×10^{-6} . Risks within the acceptable risk range may or may not warrant remedial action depending upon site-specific circumstances. Risks below this range cannot be differentiated from the background occurrence of cancer in human populations. Noncarcinogenic health risks are evaluated using a hazard index (HI). If the hazard index is less than or equal to one, the contaminant concentration is considered an acceptable level and generally assumes that the human population may be exposed to it during a 30-year period without adverse health effects. Risks calculated in a risk assessment are potential risks and are excess (i.e., over background) risks due to exposure from contaminants at the OU.

Risk Assessment Results

The risk assessment for OU-12 indicated that the total carcinogenic site risk is within the acceptable risk range for the residential scenario and is less than 1×10^{-6} for industrial scenario. The majority of the total carcinogenic site risk for the residential scenario is from exposure to surface soil contaminants from within the hardfill. The noncarcinogenic HIs are below the reasonable maximum exposures (RME) of 9×10^{-5} for current industrial land use and 1×10^{-1} for future residential land use. The average HIs for both current industrial land use and future residential land use were 3×10^{-6} and 5×10^{-2} , respectively. However, due to the heterogeneity of the hardfill contents, great uncertainty is associated with the calculated risk values.

Arsenic and benzo(a)pyrene in the sediment of the drainage areas also contributed to the total site risk. Based on the risk assessment (risk calculated for sediment is 3×10^{-6}), and other factors such as maximum concentrations, distribution, detection frequency, etc., remediation is not warranted for sediment at OU-12.

The risk to human health from the ingestion and use of the shallow ground water is 2×10^{-6} . This is on the lower end of the acceptable risk range. Based on this calculated acceptable risk and low

concentrations of contaminants detected in ground-water samples, remediation is not warranted for ground water.

The calculated risk level for the surface water at OU-12 is 8×10^{-8} , which is below the acceptable risk range. Remediation is not warranted for surface water as part of OU-12.

Risk Assessment Conclusions

Remedial action is warranted for the hardfill based on the potential risk to human health from future releases of hazardous substances from the hardfill. Contaminants in the hardfill may leach downward to contaminate the underlying ground water. Off-Base residents may then ingest or come in contact with the contaminated ground water. Also, the surface of the hardfill may erode, thus exposing off-Base residents to contaminants in both surface water and air.

Due to the potential heterogeneity of the waste materials present within the hardfill, a complete characterization of waste materials present was not possible during the RI. This adds a degree of uncertainty to the risk assessment for the hardfill contents.

Rather than attempting to fully characterize hardfill contents and gain more certainty in the risk assessment, the Air Force utilized guidance developed by EPA titled *Presumptive Remedy for CERCLA Municipal Landfill Sites* (OSWER Directive 9355.0-49FS). The presumptive remedy for landfills is containment (capping) of landfill contents. Using the presumptive remedy strategy, a quantitative risk assessment is not necessary to evaluate whether the containment remedy addresses all exposure pathways and contaminants potentially associated with a landfill. Rather, all potential exposure pathways can be identified using the conceptual site model and compared to the pathways addressed by the presumptive remedy. Containment of the landfill contents addresses exposure pathways and risks normally associated with landfills. The contaminant exposure pathways for the potential risks associated with the hardfill contents at OU-12 include (1) direct physical contact with the hardfill contents and (2) consumption or contact with ground water that may become contaminated, (3) consumption or contact with potentially contaminated surface water, and (4) ingestion of potentially contaminated sediment in the drainage channel which bisects OU-12.

Actual or threatened releases of hazardous substances from OU-12, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, and the environment.

Ecological Risks

An ecological risk evaluation of OU-12 was based on a combination of data and literature reviews, field and laboratory analyses, analyte evaluation and screening, and preliminary risk screening. The ecological risk assessment was performed in three phases, or tiers. Tier I was a screening-level risk assessment. Tiers II and III were progressively more detailed risk assessments. The pertinent findings are summarized below.

OU-12 presents a mixture of disturbed habitat, such as the exposed hardfill area and associated weedy vegetation, and attractive habitat including grassland, wetlands, and some cottonwood and

willow trees. In spite of the disturbance, including the close proximity of OU-12 to the runway, a variety of ecological receptors could be attracted to the area for foraging and possibly nesting.

Rare, threatened, or endangered species could also utilize OU-12 for foraging and possibly nesting. There were no rare, threatened or endangered animal or plant species identified at OU12. However, rare, threatened, or endangered species may utilize OU-12 as a transient habitat.

Due to the low levels of contaminant concentrations, the contaminants do not pose an unacceptable risk to these species. In addition, the limited contact these species would have with the OU-12 area ensures unacceptable risk to a single individual will not occur.

Terrestrial vegetation and soil fauna communities differ between OU-12 and a reference area. Influence of chemicals detected in the soil could be neither confirmed or denied, based on the data. This prompted movement of the OU from Tier I to Tier II ecological evaluation. Findings of the OU-12 RI indicate that the contaminants at OU-12 are not affecting species identified in the vicinity of EAFB on a population basis. However, screening of chemical concentrations in surface water, sediment, and surface soil, and sample-by-sample examination of the database, identified a number of metals and organic compounds present at sufficient concentrations to warrant a Tier III risk assessment. The Tier III risk assessment will be a Basewide ecological risk assessment to be conducted as part of OU-11.

2.7 DESCRIPTION OF ALTERNATIVES

Presumptive Remedy for CERCLA Municipal Landfill Sites, (OSWER Directive 9355.3-11FS) was the basis for the abbreviated feasibility study (FS). The OSWER directive established containment of the contamination within the landfill as the presumptive remedy for municipal landfills.

Although not specifically identified as a municipal landfill, OU-12 exhibits characteristics that make this presumptive remedy applicable. The hardfill contents at OU-12 do not have the characteristics to produce any significant leachate or gas, although detectable levels of methane gas was identified in one area of OU-12. The risk assessment did not identify the ground water as a pathway of concern. Even though the hardfill contents were not identified as a source of unacceptable risk to human health, the heterogeneity of the hardfill contents causes uncertainties in the risk assessment. Therefore, the presumptive remedy focuses on containment of the hardfill contents.

! Alternative 1- No Action

- ! The no-action alternative represents the baseline condition at OU-12 and refers to taking no action at OU-12, although existing maintenance of the site (mowing) would be continued.**

! Alternative 2 - Institutional Controls

- ! Institutional controls (access restrictions and deed restrictions).**

- ! Monitoring of ground water, and sediment.
- ! Long-term maintenance of existing soil cover.

! Alternative 3 - Capping

- ! Placing a soil cover capable of sustaining vegetation on the area of attainment at Hardfill No 1.
- ! Long-term maintenance of soil cover.
- ! Monitoring and institutional controls as stated in Alternative No. 2.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The analysis of alternatives coupled with the use of the presumptive remedy combine for a narrower range of feasible approaches to address remedial activities at OU-12.

The remedial action objectives for OU-12 are as follows:

Hardfill

- ! Prevent ingestion and dermal contact with hardfill contents.
- ! Reduce the mobility of potential contaminants in the hardfill.
- ! Control surface water runoff and erosion of the hardfill cover.

The area of attainment is defined as the area which will achieve the remedial action objectives after remediation is completed. The area of attainment for OU-12 is the extent of the hardfill areas, approximately 14 acres (Figure 2-5).

Pursuant to Section 300.430(e)(9)(iii) of the EPA's revised NCP, the remedial action to be implemented should be selected based upon consideration of nine evaluation criteria. These criteria are as follows:

1. Overall protection of human health and environment.
2. Compliance with applicable or relevant and appropriate requirements (ARARs).
3. Long-term effectiveness and permanence.
4. Reduction of toxicity, mobility, or volume of contamination.
5. Short-term effectiveness.
6. Implementability
7. Cost
8. State acceptance.
9. Community acceptance.

The following sections provide a brief review and comparison of the remedial alternatives

according to EPA's evaluation criteria.

2.8.1 Overall Protection of Human Health and the Environment

The assessment of this criterion considers how the alternatives achieve and maintain protection of human health and the environment.

Alternative 1 (no action) does nothing to reduce risk at OU-12. Alternative 2 (institutional controls) provides for maintenance of non-vegetated areas. Access restrictions would reduce risk by reducing exposure. Alternative 3 (soil cover) provides containment of the hardfill contents. This would eliminate risk associated with exposure to potential contaminants in the landfill and the future risk associated with potentially contaminated ground water.

2.8.2 Compliance with ARARs

Alternatives are assessed under this criterion in terms of compliance with ARARs. Applicable requirements include cleanup standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Relevant and appropriate requirements address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the environmental and technical factors at a particular site. The determination of "relevant and appropriate" emphasizes the similarity and appropriateness of the requirement to a site. ARARs are grouped into these three categories:

- ! **Chemical-Specific** ARARs are health or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in establishment of the amount or concentration that may be found in, or discharged to, the environment.
- ! **Location-Specific** ARARs restrict the concentration of hazardous substances or the conduct of activities solely because they are in specific locations such as flood plains, wetlands, historic places, and sensitive ecosystems or habitats.
- ! **Action-Specific** ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous wastes.

A summary evaluation of Federal and State ARARs pertinent to this remedial action is provided in Table 2-1 at the end of Section 2.0 and a narrative discussion of compliance with ARARs is provided below for the alternatives considered.

Alternative 1 (No Action):

The No Action alternative does not comply with State of South Dakota Solid Waste Management Regulations (ARSD Article 74:27). The OU-12 RI concluded that ground water has not been

adversely impacted and was not a potential transport pathway; therefore, ground water ARARs at the OU are met. Alternative 1 does not meet the remedial action objectives for OU-12. An action would not be taken to prevent human contact with surface-soil contaminants and potential contaminants within the hardfill may leach to the ground water.

Alternative 2 (Institutional Controls):

Alternative 2 does not comply with State of South Dakota Solid Waste Management Regulations. The OU-12 RI concluded that ground water has not been adversely affected and was not a potential transport pathway; therefore, ground water ARARs at the OU are met. Alternative 2 does not meet the remedial action objectives for OU-12.

Alternative 3 (Capping):

Alternative 3 will meet State of South Dakota Solid Waste Management Regulations for the disposal of solid waste by providing containment of hardfill contents, access/development restrictions, and long-term monitoring. Additional cover material will be added under this alternative to achieve compliance with the State requirements. The State is Federally authorized for the Resource Conservation and Recovery Act (RCRA) Subtitle D Municipal Solid Waste Program (8 October 1993, 58 FR 52486). The resulting cover will also ensure continued compliance with the Safe Drinking Water Act Maximum Contaminant Levels (MCLs) by preventing the downward transport of contaminants to the ground water.

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredge or fill material into waters of the United States. Section 404 is implemented through regulations set forth in 33 CFR parts 320 through 330 and 40 CFR Part 230. To fully cover the hardfill, the wetlands near the ephemeral stream may be filled. Thus may adversely affect a water of the United States. The Executive Order on Protection of Wetlands (E.O. No. 11, 990) requires Federal Agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands if a practical alternative exists. If the discharge of fill material into a water body cannot be avoided, the use of appropriate and practicable mitigation measures to minimize the adverse impact to the aquatic ecosystem will be required. Appropriate mitigation measures may be implemented during the remedial action. If wetlands at OU-12 will be adversely effected, an alternate area will be chosen for construction of a new wetland for the mitigation purposes. This ARAR will be met.

Implementation of the presumptive remedy (containment by capping) strategy for landfills has been shown by EPA to meet the remedial action objectives by preventing direct contact with hardfill contents and ingestion of surface soil and sediment.

2.8.3 Long-Term Effectiveness and Permanence

The assessment of this criterion considered the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response action objectives have

been met.

Alternative 1 would not provide additional effectiveness or permanence in reducing the potential for direct contact or ingestion of the surface soil or sediments. No further controls for the OU would be developed under this alternative.

Alternative 2 would provide for increased effectiveness of access restrictions (in addition to the general EAFB access restrictions). Additionally, maintaining vegetation on the hardfill would reduce erosion potential. Permanency and reliability of these controls would be enhanced through long-term monitoring and maintenance of the OU. Uncertainties exist for the ability to provide long-term access restrictions.

Alternative 3 would offer the highest level of long-term effectiveness. The earthen cover would reduce potential future risks to human health. Erosion would be limited by the development and maintenance of a vegetated area. Upon completion, long-term maintenance of the cover and monitoring of ground water would be provided. Future land uses will be allowed if the integrity of the hardfill cover is not compromised.

2.8.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

The assessment of this criterion involves considering the anticipated performance of specific treatment technologies an alternative may employ.

Alternative 1 would not provide for the reduction of toxicity, mobility, or volume of potential contaminants within the hardfill. Alternative 2 would reduce the mobility of contaminants in surface soils through long-term erosion maintenance of existing cover soils. Alternative 3 does not use treatment technologies, but reduces the mobility of potential contaminants in the hardfill through containment.

2.8.5 Short-Term Effectiveness

The assessment of this criterion considers the effectiveness of alternatives in maintaining protection of human health and the environment during the construction of a remedy until response action objectives have been met.

It is not anticipated that the proposed alternatives would significantly impact worker or community health and safety during the implementation period. Alternatives 2 and 3 may impact community and worker health and safety through dust emissions during the initial construction phase. The impact could be minimized through dust mitigation.

Alternatives 2 and 3 may create a short-term increase in risk during remedial activities due to the inhalation exposure pathway. Disturbances of surface soil through earthwork and soil disturbance would result in exposure to workers. Dust mitigation during these activities would minimize this potential impact. Alternative 3 would present the potential for temporarily increasing the opportunity for erosion of the disturbed soil, although erosion and sediment control measures will help to minimize this adverse impact.

2.8.6 Implementability

The assessment of this criterion considers the administrative and technical feasibility of implementing the alternatives and the availability of necessary goods and services for implementation of the response action.

Alternative 1 would not be difficult to implement since, aside from long-term monitoring, no further action would be undertaken.

Alternative 2 requires no special or unique activities and could be implemented using locally available materials and contractors. Long-term monitoring would indicate whether additional action would need to be implemented in the future.

Alternative 3 could be implemented with standard construction equipment, materials, and methods. The availability of an on- or off-Base supply of cover material will require further consideration during the remedial design analysis. Wetlands mitigation (as a result of drainage modifications) could also be implemented with standard construction equipment, materials, and methods. Land use (or deed) restrictions can be implemented at EAFB by various administrative means.

2.8.7 Cost

A summary of the costs for each alternative is presented on the following page.

Alternative No. 1 (No Action)	
Total Capital Costs	\$0
Total Annual (Sampling/Analysis) Costs	\$0
30-Year Present Value for Annual Costs Annual Costs= \$0 Years = 30 Discount Rate = 5%	\$0
TOTAL 30-Year Present Value	\$0
Alternative No. 2 (Institutional Controls)	
Total Capital Costs	\$180,000
Total Annual (Sampling/Analysis/O&M) Costs Years 1-5	\$130,500
Total Annual (Sampling/Analysis/O&M) Costs Years 6-30	\$66,700
30-Year Present Value for Annual Costs Annual Cost Year 1-5 = \$130,500 Annual Cost Year = \$66,700 Years = 30 Discount Rate = 5%	\$1,301,500
TOTAL 30-Year Present Value	\$1,481,500
Alternative No. 3 (Capping)	
Total Capital Costs	\$1,497,500
Total Annual (Sampling/Analysis/O&M) Costs Years 1-5	\$130,500
Total Annual (Sampling/Analysis/O&M) Costs Years 6-30	\$66,700
30-Year Present Value for Annual Costs Annual Cost Year 1-5 = \$130,500 Annual Cost Year 6-30 = \$66,700 Years = 30 Discount Rate = 5%	\$1,301,500
TOTAL 30-Year Present Value	\$2,799,000

2.8.8 State Acceptance

The assessment of this criterion considered the State's preferences for or concerns about the alternatives.

The State concurs with the selected remedy. The State provided comments on the remedial investigation, feasibility study, Proposed Plan, and this ROD. After incorporating adequate responses to the comments into the respective documents, the State concurred with the remedy.

2.8.9 Community Acceptance

Comments offered by the public were used to assess the community acceptance of the proposed alternative. The community expressed its concerns about the selected remedy during the public comment period. The questions and concerns of the community are discussed in detail in the Responsiveness Summary, which is Appendix B of this ROD.

2.9 SELECTED ALTERNATIVE

Based on the requirements of CERCLA, comparative analysis of the nine criteria, public comments, and in consultation with EPA and the State, the Air Force has determined that the selected alternative is Alternative 3, Capping. This alternative includes institutional controls in conjunction with physical modification of the OU to reduce potential risk. Five-year reviews of the remedy will be required because potential contaminants will remain at OU-12 following completion of remedial action. Major components of Alternative 3 are:

- ! Install an earth cover over the area of attainment at Hardfill No 1.
- ! Institutional controls to prevent future use of the area for residential use and/or limiting its use to industrial uses.
- ! Developing a long-term monitoring and maintenance plan for the hardfill.

Each of these items is discussed below.

Installation of Soil Cover

An earthen cover over will be placed over Hardfill No. 1 (approximately 14 acres). Cover will be graded and contoured to maintain stability and route surface-water runoff away from previously active fill areas and prevent ponding of the water. The cover will be vegetated to enhance evapotranspiration and reduce infiltration and soil erosion. A pre-design study will be conducted to examine the need for landfill gas control measures, and evaluate the need for erosion control measures along the stream adjacent to the hardfill areas.

If the discharge of fill material into a water body cannot be avoided, the use of appropriate and practicable mitigation measures to minimize the adverse impact to the aquatic ecosystem will be required. Appropriate mitigation measures may be implemented during the remedial action. If lining or filling of the drainage channel results in adverse impacts to wetlands at OU-12, an

alternate area will be chosen for construction of a new wetland for the mitigation purposes.

Institutional Controls

Institutional controls would be implemented to prevent human exposure to contaminated soil and ground water. These controls will include: (1) issuing a continuing order by the Installation Commander to restrict access to the hardfill and to restrict or control temporary construction activities unless proper protective equipment is worn; (2) filing a notice with the State of South Dakota to recommend denial of water rights permit applications to install ground-water wells within the hardfill boundary and any area which may be affected by potential contaminants within the landfill; (3) filing a notice to the deed detailing the restrictions of the continuing order and ground-water well restrictions; and (4) a covenant to the deed in the event of property transfer.

The continuing order would be issued by the Installation Commander to restrict access to or disturbance of the hardfill as long as Ellsworth AFB owns the property. Specifically, it would:

- ! Restrict or place limitations on the installation of any new underground utilities or other construction activities in the area of the hardfill, thus preventing accidental exposures to construction workers.
- ! Provide for the use of proper protective equipment, in the event that access through the hardfill cover is required.
- ! Require that the integrity of the hardfill cover be maintained. Limit future land uses to non-intrusive activities only. Maintenance of the hardfill will require development of standard operating procedures (SOPS) to provide for inspections and repairs. To assist with the institutional controls, a fence may be placed around the hardfill and authorized personnel would have access through a locked gate. Access would only be allowed to perform hardfill monitoring and maintenance activities. Warning signs would be posted at the hardfill to deter unauthorized access.

The continuing order also would mandate that, if the hardfill cover was ever removed or breached, the area of attainment would be re-evaluated to determine the need for a replacement cap or other remedial action.

Continuing order requirements will be in effect as long as the property is owned by Ellsworth AFB. In the case of the sale or transfer of property within OU-12 by the United States to any other person of entity, the Air Force will place covenants in the deed, which will restrict access and prohibit disturbance of contaminated soils or the remedial action without approval of the United States. These covenants will be in effect until removed upon agreement of the State of South Dakota, the U.S. Environmental Protection Agency, and the U.S. Air Force or their successors in interest. The Air Force will also include in the deed the covenants required by section 120(h)(3) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which include (1) a warranty that the United States will conduct any remedial action found to be required by law after the date of the transfer, (2) a right of access in behalf of EPA and the Air Force or their successors in interest to the property to participate in any response or corrective action that might be required after the date of transfer. The right of access

referenced in the preceding sentence shall include the State of South Dakota for purposes of conducting or participating in any response or corrective action that might be required after the date of transfer.

Long-Term Monitoring and Maintenance

A maintenance program would be established to ensure the long-term integrity hardfill conditions remedy would be maintained. The maintenance program would include development of standard operating procedures (SOPs) to provide for inspections, repairs, and general maintenance of the hardfill.

A long-term monitoring program will be developed and implemented during remedial action and is subject to approval of both EPA and SDDENR. Contaminant concentrations in the sediment and ground water will be monitored to evaluate the effectiveness of the hardfill cover and to determine if ground-water contaminants have been transported beyond the hardfill boundaries.

This alternative will meet the remedial action objectives and reduce the potential risk for OU-12 by reducing the mobility of potential contaminants in the hardfill. This will be achieved by the construction of the hardfill cover and maintenance and possible modification of drainage channel.

This alternative meets the statutory requirements of Section 121 of CERCLA as amended by SARA. These statutory requirements include protectiveness of human health and the environment, compliance with ARARs, cost effectiveness, and use of permanent solutions and alternative treatment technologies to the extent practicable.

The statutory preference for treatment is not satisfied; however, the selected alternative is the presumptive remedy (containment) developed by EPA for landfills.

Alternative 3 would limit exposure of hardfill materials, and contaminants present in surface soils and sediment at the OU, to humans, wildlife and the environment. Therefore the selected alternative will be protective of human health and the environment and will comply with ARARs.

2.10 STATUTORY DETERMINATIONS

The selected remedy meets the statutory requirements of CERCLA as amended by SARA. These requirements include protection of human health and the environment, compliance with ARARs, cost effectiveness, utilization of permanent solutions and alternative treatment technologies to the extent practicable. Containment, by definition, does not attempt to reduce the toxicity or volume of potentially hazardous materials; rather, it reduces the likelihood of exposure to these materials by preventing the movement of materials beyond the boundaries of the hardfill and preventing direct contact with hardfill materials. The selected remedy represents the best balance of tradeoffs among the alternatives considered, with respect to pertinent criteria, given the scope of the action.

The manner in which the selected remedy meets each of these requirements is discussed in the sections below.

2.10.1 Protection of Human Health and the Environment

The selected remedy addresses health and environmental issues that were identified in the OU-12 RI report. Specifically, the capping alternative:

- ! Eliminates exposure to hardfill contents by installing an earthen cap.
- ! Reduces the potential infiltration of contaminants to the ground water.
- ! Prevents unauthorized access to the area by installing a perimeter fence and restricted access signs.
- ! Provides for long-term monitoring of ground water and sediment to identify potential future risks associated with OU-12.

2.10.2 Compliance with ARARs

Alternative 3 will meet State landfill closure requirements by providing containment of hardfill contents, access/development restrictions and long-term monitoring. The OU-12 RI concluded that ground water has not been adversely affected and was not a potential transport pathway, therefore ground water ARARs at the OU are met. Wetlands adversely affected by the remedial activities may need to be mitigated. Additional information about ARAR compliance is contained in Section 2.8.2.

Implementation of the presumptive remedy (containment by capping) strategy for landfills has been shown by EPA to meet the remedial action objectives by preventing direct contact with landfill contents.

2.10.3 Cost Effectiveness

The selected remedy provides overall effectiveness in reducing human health risks relative to its costs. The presumptive remedy process insures cost-effective remedies are chosen. The chosen hardfill cover type ensures containment of the hardfill contents. Site specific conditions were used to determine the type of cover necessary for the hardfill. Based on the information provided during the remedial investigation, a more costly cover would not be cost effective.

2.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Extent Possible

EPA has established that proper capping has proven effective in containing landfill contents. This alternative provides long-term prevention of exposure to potential hardfill material, prevents unauthorized access, and provides for long-term ground water monitoring to detect movement of chemicals from the area. A five-year review of the selected remedy will be performed because contaminants may be remaining within the hardfill. The review will be conducted no less often than every five years after the signing of the ROD to ensure the remedy continues to provide adequate protection of human health and the environment.

2.10.5 Preference for Treatment as a Principal Element

Treatment of the hardfill contents is not supported based on the findings of the remedial investigation for OU-12. No identifiable hot spots were reported present and the risks associated with OU-12 can be addressed by eliminating exposure to the hardfill contents by capping.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected action is the same as the preferred alternative presented in the Proposed Plan for OU-12 remedial action. There have been no changes relative to the Proposed Plan.

TABLE 2-1 EVALUATION OF FEDERAL AND STATE ARARS THAT APPLY TO OU-12, ELLSWORTH AFB, SOUTH DAKOTA

Applicable or Relevant and Appropriate **Federal** Standards, Requirements, Criteria and Limitations

Standard, Requirement, Criteria or Limitation	Citations	Description	ARAR Type	Applicability to OU-12
Safe Drinking Water Act	42 USC 300, f, g			
National Primary Drinking Water Standards	40 CFR Part 141.60-0.63	Establishes health based standards for public water systems (maximum contaminant levels).	Chemical	Relevant and appropriate for federal Class II aquifers.
National Secondary Drinking Water Standards	40 CFR Part 143.3	Establishes aesthetic based standards for public water systems (maximum contaminant levels).	Chemical	Relevant and appropriate.
Maximum Contaminant Level Goals	40 CFR 141.50 and Public Law No. 99-330, 100 Stat. 642 (1986)	Establishes drinking water quality goals set at concentrations of unknown or anticipated adverse health effects with an adequate margin of safety.	Chemical	Relevant and appropriate.
Clean Water Act	33 USC-1251-1376			
Water Quality Criteria	40 CFR Part 131.36	Establishes criteria for water quality based on toxicity to aquatic organisms and human health.	Chemical	Relevant and appropriate Aquifer may be a federal Class II A (discharge to surface water).
Criteria and Standards for the National Pollutant Discharge Elimination System	40 CFR Part 125.1-.3	Establishes criteria and standards for technology-based requirements in permits under the Clean Water Act.	Chemical	Relevant and appropriate.

TABLE 2-1 EVALUATION OF FEDERAL AND STATE ARARS THAT APPLY TO OU-12, ELLSWORTH AFB, SOUTH DAKOTA
(Continued)

Standard, Requirement, Criteria or Limitation	Citations	Description	ARAR Type	Applicability to OU-12
Executive Order on Protection of Wetlands	E.O. No. 11,990 40 CFR 6.302(a) & Appendix A	Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	Action/Location	Applicable. OU-12 has wetland areas adjacent to remediation areas.
Clean Air Act				
National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50.1-.6, .8, .9, .11, .12	Establishes standard for ambient air quality to protect public health and welfare.	Action	Applicable. Methane treatment may be required at OU-12.
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	Establishes regulatory standard for specific air pollutants.	Action	Applicable. Methane treatment may be required at OU-12.

TABLE 2-1 EVALUATION OF FEDERAL AND STATE ARARS THAT APPLY TO OU-12, ELLSWORTH AFB,
SOUTH DAKOTA (Continued)

Applicable or Relevant and Appropriate State Standards, Requirements, Criteria and Limitations

Standard, Requirement, Criteria or Limitation	Citations	Description	ARAR Type	Applicability to OU-12
South Dakota Waste Management Regulations	74:26:03:04	Establishes requirements for disposal of hazardous wastes in sanitary landfills.	Action	Relevant and appropriate.
South Dakota Waste Management Regulations	74:27:03:11	Defines requirements for closure of solid waste disposal facilities.	Action	Relevant and appropriate.
South Dakota Waste Management Regulations	74:27:15	Establishes standards for landfill closure and post-closure monitoring.	Action	Relevant and appropriate. Landfill closure imminent for OU-12.
South Dakota Water Quality Standards	74:03:04:02, 10	Defines use of Box Elder Creek and certain tributaries.	Action	Relevant and appropriate.
South Dakota Ground Water Standards	74:03:15	Defines ground water classifications by beneficial use and sets chemical standards.	Chemical	Relevant and appropriate.
South Dakota Surface Water Quality Standards	74:03:02	Establishes surface water quality standards.	Chemical	Relevant and appropriate. Surface water exists at OU-12.
South Dakota Remediation Criteria for Petroleum-Contaminated Soils	74:03:32	Establishes requirements for the remediation of soil contaminated with petroleum products.	Chemical	Relevant and appropriate.

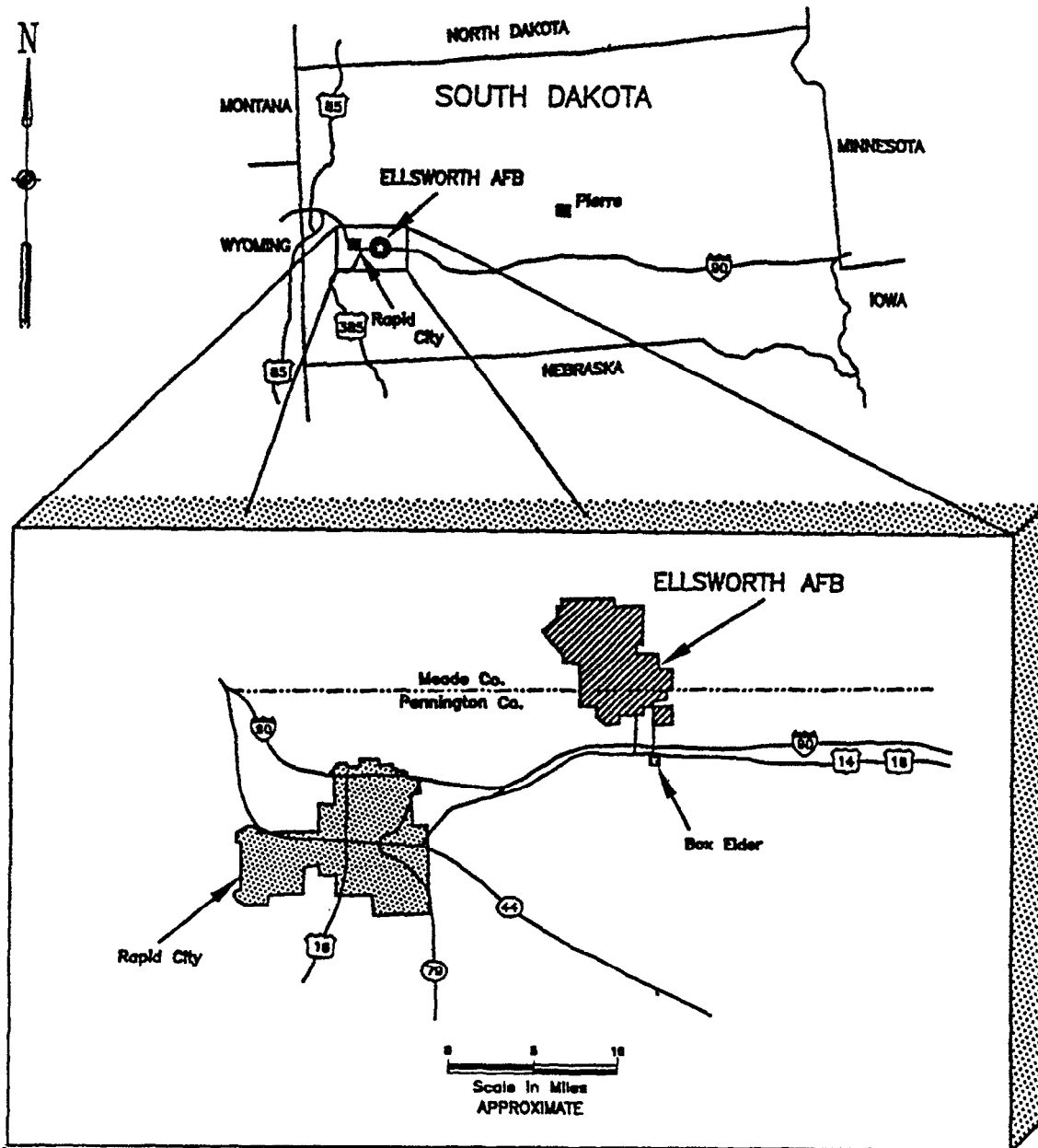
3.0 LIST OF ACRONYMS AND ABBREVIATIONS

ACC:	Air Combat Command
AF:	Air Force
AFB:	Air Force Base
ARARs:	Applicable or Relevant and Appropriate Requirements
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
COC:	Chemicals of Concern
DNAPL:	Dense non-aqueous phase liquid
EAFB:	Ellsworth Air Force Base
EP:	Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.
EPA:	Environmental Protection Agency
FFA:	Federal Facilities Agreement
FPTA:	Fire Protection Training Area
FTA:	Fire Training Area
GPR:	Ground Penetrating Radar
HQ:	Headquarters
IN SITU:	In the original place
IRIS:	Integrated Risk Information System
IRP:	Installation Restoration Program
JP-4:	Jet Propulsion Fuel Number Four; contains both kerosene and gasoline fractions.
LNAPL:	Light Non-Aqueous Phase Liquid
MCL:	Maximum Contaminant Levels
mgd:	Million Gallons per Day
Fg/L:	Micrograms per liter
mg/L:	Milligrams per liter
MSL:	Mean Sea Level
NAPL:	Non Aqueous Phase Liquid
NCP:	National Oil and Hazardous Substances Contingency Plan
NEPA:	National Environmental Policy Act
NPDES:	National Pollutant Discharge Elimination System
NPDWR:	National Primary Drinking Water Regulations
NPL:	National Priorities List
OU:	Operable Unit
O&G:	Symbols for oil and grease
PAH:	Polynuclear Aromatic Hydrocarbon
PCB:	Polychlorinated Biphenyl; liquids used as a dielectrics in electrical equipment

PCE: Perchloroethylene; liquids used in degreasing or paint removal.
PL: Public Law
ppm: Parts per million by weight
RAO: Remedial Action Objective
RCRA: Resource Conservation and Recovery Act
RI/FS: Remedial Investigation/Feasibility Study
ROD Record of Decision
SARA: Superfund Amendments and Reauthorization Act
SACM: Superfund Accelerated Cleanup Model
SVOC: Semivolatile Organic Compound
TCA: 1, 1, 1,-tetrachloroethane
TCE: Trichloroethylene
TCL: Target Compound List
TCLP: Toxicity Characteristic Leaching Procedure
TDS: Total Dissolved Solids
TOC: Total Organic Carbon
TSD: Treatment, storage or disposal sites/methods
USAF: United States Air Force
U.S. EPA: United States Environmental Protection Agency
USDA: United States Department of Agriculture
USFWS: United States Fish and Wildlife Service
USGS: United States Geological Survey
VES: Vertical Electrical Sounding
VOC: Volatile Organic Compound
WQC: Water Quality Criteria
WWTP: Wastewater Treatment Plant

APPENDIX A

FIGURES



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DATE: 08/22/1995 TIME: 09:02



ELLSWORTH
AIR FORCE BASE

ELLSWORTH AFB
RAPID CITY, SOUTH DAKOTA

AREA LOCATION MAP

PROJECT MGR

DESIGNED BY

DRAWN BY

MRG

CHECKED BY

SCALE

AS SHOWN

DATE

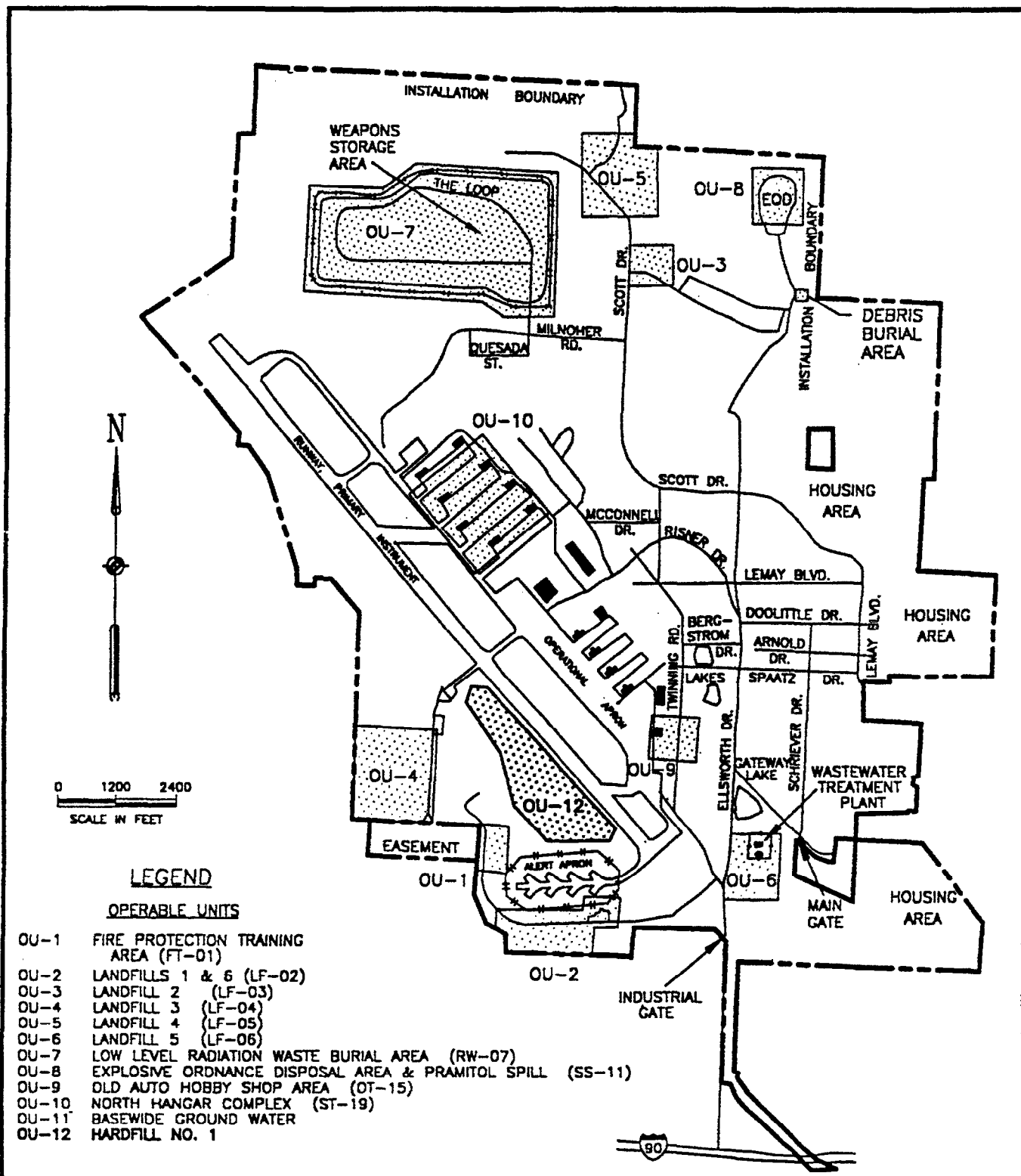
JUNE 94

PROJECT NO


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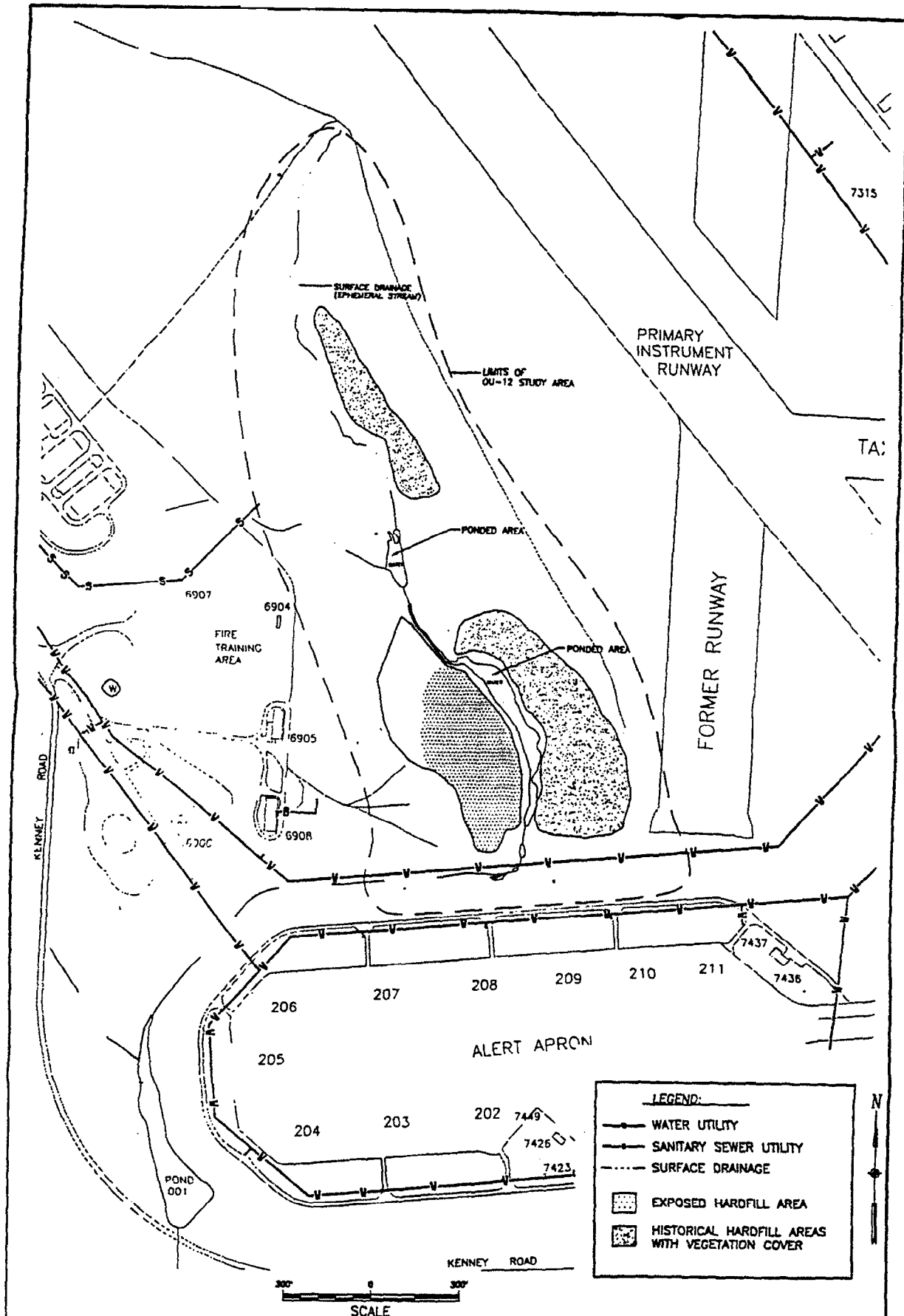
FIGURE:

2-1

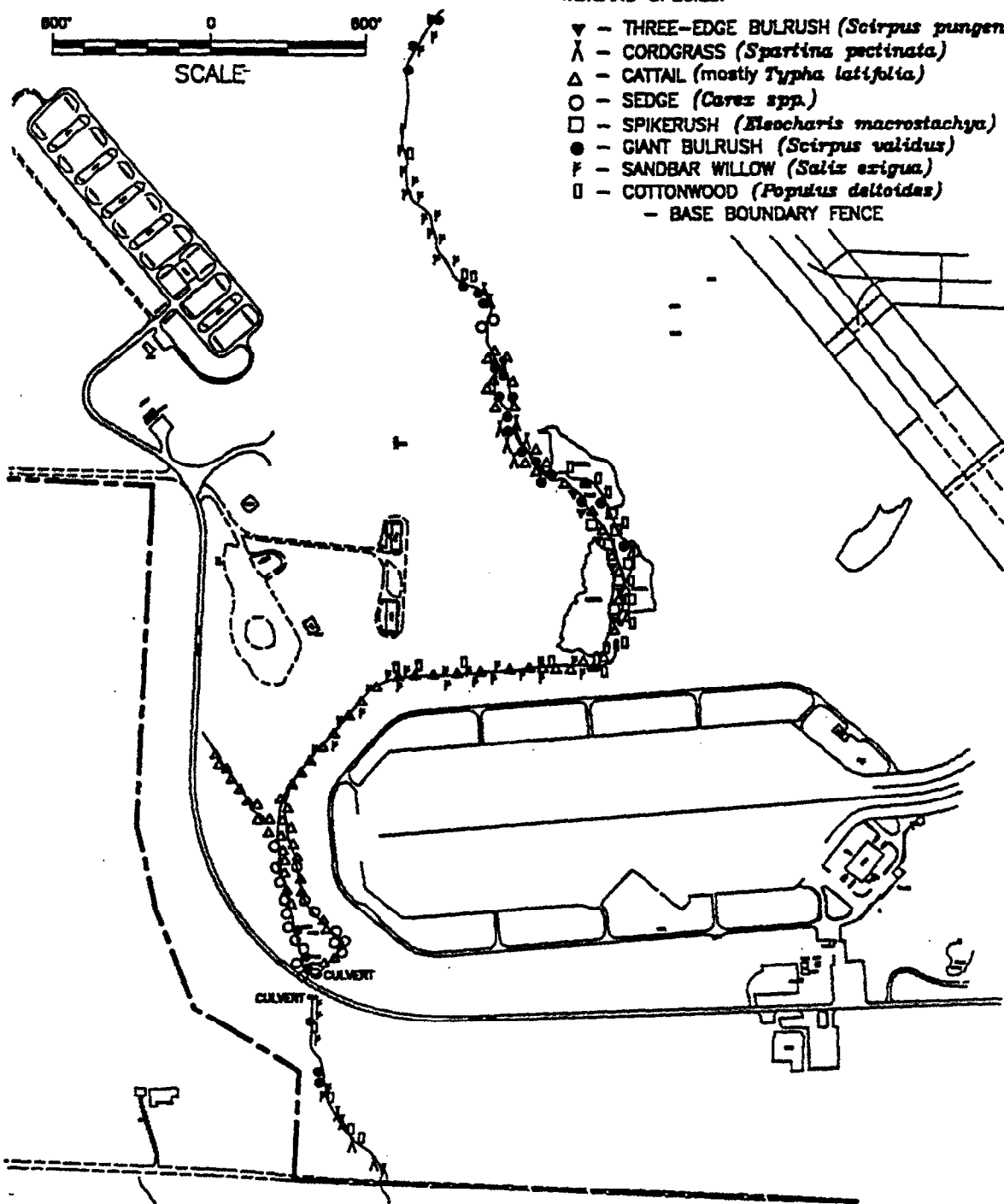


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DATE: 02/02/1996 TIME: 09:05

 ELLSWORTH AIR FORCE BASE			ELLSWORTH AFB RAPID CITY, SOUTH DAKOTA			SITE LOCATION MAP	
PROJECT MGR	DESIGNED BY	DRAWN BY STAFF	CHECKED BY	SCALE AS SHOWN	DATE MAY 95	PROJECT NO 60378.85	FIGURE: 2-2




	ELLSWORTH AFB RAPID CITY, SOUTH DAKOTA	OU-12 SITE AREA MAP	DESIGNED BY	DRAWN BY	DATE	PROJECT NO.
			CHECKED BY	PROJECT MGR.	SCALE	FIGURE
				STAFF	MAY 95	60378.85
					AS SHOWN	2-3



- WETLAND SPECIES:
- ▼ - THREE-EDGE BULRUSH (*Scirpus pungens*)
 - λ - CORDGRASS (*Spartina pectinata*)
 - Δ - CATTAIL (mostly *Typha latifolia*)
 - - SEDGE (*Carex* spp.)
 - - SPIKERUSH (*Eleocharis macrostachya*)
 - - GIANT BULRUSH (*Scirpus validus*)
 - ⌢ - SANDBAR WILLOW (*Salix exigua*)
 - ▢ - COTTONWOOD (*Populus deltoides*)
 - - - BASE BOUNDARY FENCE

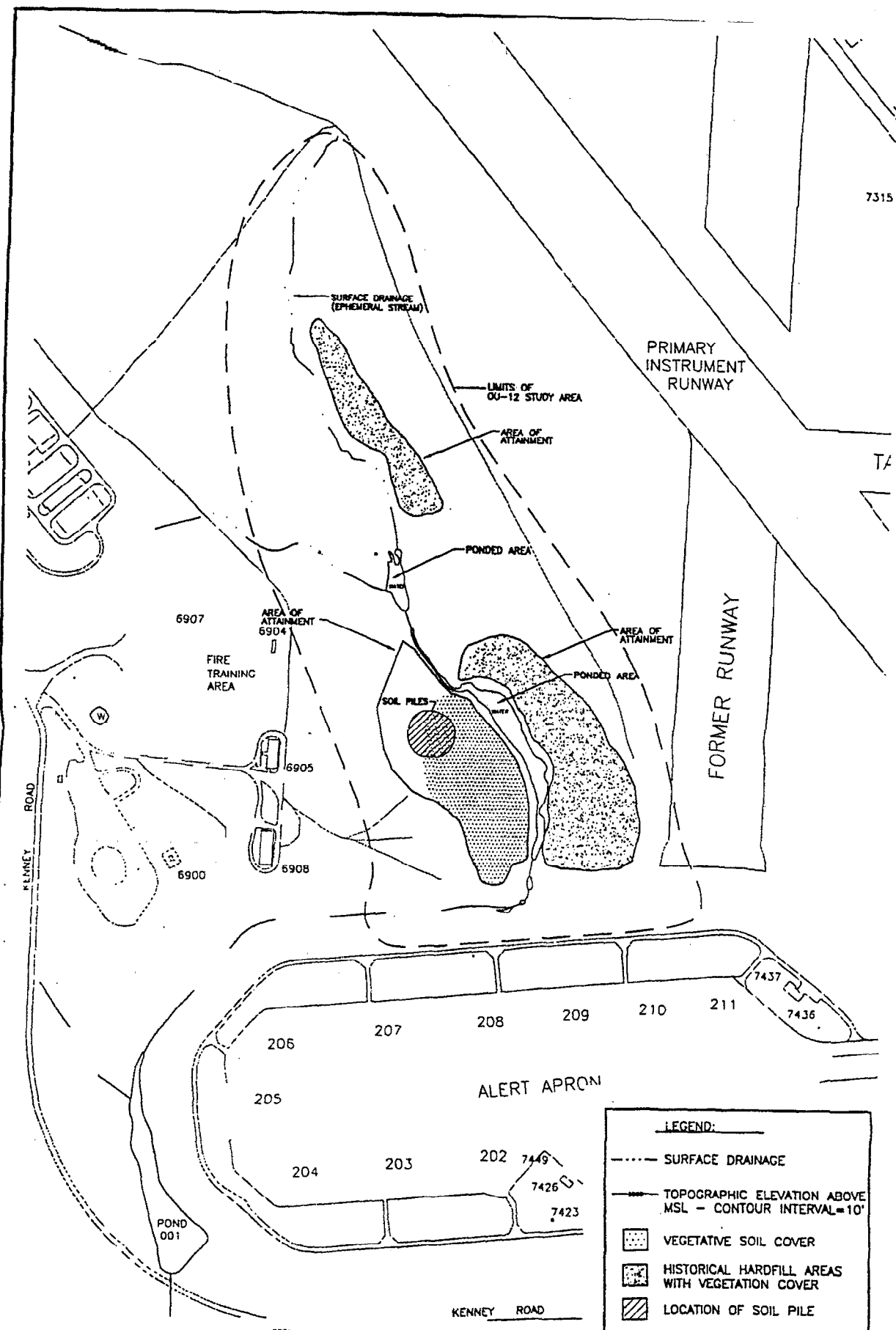
NOTE: Map represents general distribution of dominant wetland species

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		ELLSWORTH AIR FORCE BASE		ELLSWORTH AFB PROJECT LOCATION		1993 RI OU-2, OU-1, & OU-12 WETLANDS VEGETATION MAP	
PROJECT MGR	DESIGNED BY	DRAWN BY DJS	CHECKED BY	SCALE AS SHOWN	DATE MAR 94	PROJECT NO 60378.85	FIGURE 2-4

DRAWING NAME: F:\HORIZONS\NEW\MULTI-OU\VEG1-2-4
DATE: 02/02/1996 TIME: 09:16

DESIGNED BY: JAMES F. WOODS/DAVID M. BOYD/DAVID A. LEE
 DATE: 07/03/95
 SCALE: AS SHOWN



ELLSWORTH
AIR FORCE BASE

ELLSWORTH AFB
RAPID CITY, SOUTH DAKOTA

OU-12
AREA OF
ATTAINMENT

DESIGNED BY	DRAWN BY	DATE	PROJECT
	STAFF	JULY 95	60378
CHECKED BY	PROJECT MGR.	SCALE	FIGURE
		AS SHOWN	2-1

APPENDIX B

RESPONSIVENESS SUMMARY

**Responsiveness Summary
Remedial Action at Operable Unit Twelve
Ellsworth Air Force Base, South Dakota**

1. Overview

The United States Air Force (USAF) established a public comment period from December 28, 1995 to January 27, 1996 for interested parties to review and comment on remedial alternatives considered and described in the Proposed Plan for Operable Unit Twelve (OU-12). The Proposed Plan was prepared by the USAF in cooperation with the U.S. Environmental Protection Agency (USEPA) and the South Dakota Department of Environment and Natural Resources (SDDENR).

The USAF also held a public meeting at 7:30 p.m. on January 11, 1996 in the 28th Bomb Wing Auditorium at Ellsworth Air Force Base (EAFB) to outline the proposed remedy to reduce risk and control potential hazards at the Operable Unit (OU).

The Responsiveness Summary provides a summary of comments and questions received from the community at the public meeting and during the public comment period, as well as the USAF's responses to public comments.

The Responsiveness Summary is organized into the following sections:

- Background on Community Involvement
- Summary of Comments and Questions Received During the Public Comment Period and USAF Responses
- Remedial Design/Remedial Action Concerns

Based on the requirements of CERCLA, comparative analysis of the nine criteria, public comments, and in consultation with EPA and the State, the Air Force has determined that the selected alternative is Alternative 3, Capping. Major components of Alternative 3 are:

- Install an earth cover over the area of attainment at Hardfill No 1.
- Institutional controls to prevent future use of the area for residential use and/or limiting its use to industrial uses.
- Developing a long-term monitoring and maintenance plan for the hardfill.

2. Background on Community Involvement

On August 30, 1990 EAFB was listed on the USEPA's National Priorities List (NPL). A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, EPA, and the State and went into effect on April 1, 1992. The FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions for EAFB.

Community relations activities that have taken place at EAFB to date include:

- **FFA process.** After preparation of the FFA by the USAF, EPA, and SDDENR, the document was published for comment. The FFA became effective April 1, 1992.
- **Administrative Record.** An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.
- **Information repositories.** An Administrative Record outline is located at the Rapid City Library (public repository).
- **Community Relations Plan (CRP).** The CRP was prepared and has been accepted by EPA and the State of South Dakota and is currently being carried out. An update to this plan will be prepared in 1996.
- **Restoration Advisory Board (RAB).** The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to USAF, EPA, and South Dakota oversight personnel, the RAB includes community leaders and local representatives from the surrounding area.
- **Mailing list.** A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.
- **Fact sheet.** A fact sheet describing the status of the IRP at EAFB was distributed to the mailing list addressees in 1992.
- **Open house.** An informational meeting on the status of the IRP and other environmental efforts at EAFB was held on May 6, 1993. An open house was held November 16, 1995 in conjunction with the Restoration Advisory Board meeting. Information on the status of environmental efforts at EAFB was provided..
- **Newspaper articles.** Articles have been written for the base newspaper regarding IRP activity.

The Proposed Plan for this remedial action was distributed to the mailing list addressees for their comments and additional copies of the Proposed Plan were available at the January 11, 1996 public meeting. A transcript of comments, questions and responses provided during the public meeting was prepared. Based on these public meetings, there have been no key public issues with the exception of surface water runoff from OU-12.

3. Summary of Comments and Questions Received During the Public Comment Period and USAF Responses

Part I - Summary and Response to Local Community Concerns

Review of the written transcript of the public meeting did not indicate community objections to the proposed remedial action. No written comments were received during the public comment period.

The majority of the comments received during the public meeting were in the form of questions about the remedial, investigation findings, the remedial action; i.e., what would be done, how it would be done, and what effects the action might have. Representatives of the USAF were available to provide answers to the questions and also provided an overview presentation during the meeting to describe the proposed actions.

Part II - Comprehensive Response to Specific Technical, Legal and Miscellaneous Questions

The comments and questions below are in the order they appear in the written transcript of the January 11, 1996 public meeting.

Comment 1. Mayor Baldwin

Asked about whether the cost for covering the landfill could be justified for a landfill that poses no unacceptable risk.

Response: The presumptive remedy was selected as the preferred alternative based on the uncertainty associated with the presence of hazardous substances within the hardfill. It is not practical to determine the exact type and quantity of contaminants within the hardfill; the cost of such an investigation would be prohibitive. Narrowing scope of investigation allowed the Air Force to save money up-front. The soil cover is an economical type of cover which permits the Air Force to achieve a great degree of confidence that the public health and safety is being protected. The cover would also prevent future releases of unidentified contaminants from within the hardfill to the underlying ground water. If the ground water were to become contaminated, a large amount of money would be needed for the ground-water remediation, similar to the money being spent for the ground-water cleanup at OU-4.

Comment 2. Jan Deming

Asked about whether the results of the methane gas survey would change the preferred alternative for the site, and, if so, would any changes be brought before the public for comment.

Response: The results of the methane gas survey will be used to determine the extent of the area with methane, and the concentrations of methane in those areas. The main concern with methane is that it might hinder the growth of vegetation. The study will determine whether the level of methane is sufficient to warrant methane gas venting as part of the cover system.

Comment 3. Jan Deming

Asked if the methane gas poses a health risk to humans.

Response: Methane is not a risk to humans at OU-12. Methane is the result of decomposition of organic material such as domestic refuse. All landfills that contain domestic refuse vent methane to the atmosphere, except in the case of very, very large landfills. The explosive nature of methane is generally the primary concern at landfills which require a nonpermeable cover. Since the cover at OU-12 will be made of permeable earthen materials, methane (if present) would not accumulate beneath the cover and present the explosive risk.

Comment 4. Phyllis Engleman

Asked if the drainage through the middle of OU-12 had any contaminants?

Response: Jet-fuel related contaminants were present in the sediment. The contaminants were evaluated in the risk assessment. The calculated risk for the drainage channel is within the acceptable range. The sediment is also being investigated as part of the Basewide Ecological Risk Evaluation under OU-11. If there is any need for remediation based on the findings of OU-11, it will be addressed in the OU-11 Proposed Plan.

4. Remedial Design/Remedial Action Concerns

During the Remedial Design (RD), the Base will make available a fact sheet and a notice of availability of the Record of Decision to allow additional public involvement.